PAM 91(08):(*3)[1954-57 NORTH POLE 4]

PAM 91/08):(*3)[1954-57 NORTH POLE 4]

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60-17672

"DRIFT OF THE STATION 'NORTH POLE 4' IN THE POLAR SECTOR OF THE CENTRAL POLAR BASIN"

by

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[NB: This article was published originally in MORSKOI FLOT, No. 6, 1958, according to a pencilled notation on the reproduction used for the translation.]

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Translator's Note

The purpose of this translation was to transpose the original Russian into conventional English; nevertheless this final draft is not free from seemingly unavoidable traces of the style of the original.

Also, while it is realized that certain of the English equivalents used may not be standard in current practice, an effort was made to avoid misleading terminology.

And, although the facts and figures presented in the following pages are exactly the same as in the original text, the translator would like to point out there is no guarantee that the original Russian text was free from typographical or other errors having the tendency to slip into a printed text.

GRAPHICS

Two graphics accompanied the text:

1. A map, "Chart of the Drift of the Station 'N[orth] P[ole] 4' and the Average Pressures for October through March 1956-1957."

    Solid line: The drift of NP-4
    Broken line: Average Pressures

    (This information is to aid in interpretation of the map as it appeared in the original article. It is not reproduced in this translation.)

2. A table, "Basic Characteristics of the Drift of the Station 'North Pole 4' in the Polar Sector."

    (Included in this translation.)

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Table

BASIC CHARACTERISTICS OF THE DRIFT OF THE STATION 'NORTH POLE 4' IN THE POLAR SECTOR

year & month	REAL DRIFT		TRUE DRIFT			
1956						
April -30	47.2	4.29	16.0	352	1.46	0.34
May	102.7	3.31	54.6	42	2.76	0.53
June	245.3	8.13	177.6	355	5.92	0.72
July	227.2	7.62	166.5	300	5.36	0.73
Aug.	181.3	5.66	33.8	200	1.05	0.18
Sept.	214.6	7.40	180.0	248	6.20	0.83
Oct.	158.5	5.11	70.0	208	2.26	0.44
Nov.	162.6	5.42	57.4	267	1.91	0.35
Dec.	188.7	6.29	41.6	317	1.39	0.22
1957						
Jan.	194.8	6.49	65.0	220	2.17	0.33
Feb.	99.0	3.54	18.5	300	0.66	0.19
March	126.9	3.96	50.0	234	1.56	0.28
Apr. 1-19 inc.	94.8	4.99	72.0	169	3.79	0.76

BASIC CHARACTERISTICS OF THE DRIFT OF THE STATION 'NORTH POLE 4' IN THE POLAR SECTOR

YEAR & MONTH	REAL DRIFT		TRUE DRIFT				
1956							
April	47.2	[illegible]	[illegible]		1.46	0.34	[illegible]
-30 May	102.7	[illegible]	[illegible]		2.76	0.53	[illegible]
June	245.3	[illegible]	[illegible]	[illegible]	5.92	0.72	[illegible]
July	227.2	[illegible]	[illegible]	[illegible]	5.36	0.73	[illegible]
Aug.	181.3	[illegible]	[illegible]	[illegible]	[illegible]	0.18	[illegible]
Sept.	214.6	[illegible]	[illegible]	[illegible]	[illegible]	0.83	[illegible]
Oct.	158.5	[illegible]	[illegible]	[illegible]	[illegible]	0.44	[illegible]
Nov.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.35	[illegible]
Dec.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.22	[illegible]
1957							
Jan.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.33	[illegible]
Feb.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
March	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Apr. -23 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

On April 20, 1957, the drifting scientific research station NORTH POLE 4 ceased operation on the meridian of Greenwich (0°) at Lat. 85° 52' N., 525 km. off Cape North-East, Greenland. While it was in commission it was the best known of the drifting stations and engaged in conducting scientific observations of the ice of the Arctic ocean. The station was in existence for a period of three years, and during the time of its drift, it made a voyage of a total of almost 7050 km., at an average speed of drift of 6.35 km. per day. The true drift of the station was established at about 2050 km., at an average speed of drift of 1.83 km. per day.

The characteristic of the drift of the station NORTH POLE 4 is that it proceeded from its starting point Lat. 75° 48' N. - Long. 178° 25' W., approximately along the 180th. meridian, which demarks the Eastern and the Western Hemispheres, to the mathematical point of the North Pole, with only occasional minor deviations to port or starboard. On July 5, 1956, the ice-floe station NORTH POLE 4 came within 12.7 km. of the mathematical point of the North Pole. This position, Lat. 89° 53' N. - Long. 178 04' W., is the northernmost point attained in free drift. The station NP-1 was organized at a

After passing the North Geographic Pole, the ice-field of the station NP-4 changed the direction of its drift and began to go with the current SSW to Lat. 89° 28' N. - Long. 67° 25' E. Elapsed time of the drift in this direction was about 40 days, from July 5 to August 10, 1956. On August 10, 1956, the shifting of the ice floe to the SSW ceased, and to the end of the month it described large counter-clockwise loops approximately round the point of Lat. 88° 2[illegible]' N. - Long. 71° 00' E. In September 1956, the longest real drift was recorded: 180 km., WSW, bearing 248°. The average speed of the real drift during this period was established at 6.20 km. per day, with a coefficient of rectilinearity equal to 0.83. [Author's Note: The coefficient of rectilineraity is the ratio of the distance of the true drift to that of the real drift.]

From October 1956 until April 20, 1957, the ice-field of the station drifted towards the north shores of Greenland, between Lats. 88-86° N. - Longs. 35-0 The distance of the true drift during the 170 days of this period was established at 273 km., WSW, at an average speed of drift of 1.63 km. per day. At the same time

distance of the real drift for this period [illegible] established at 930 km., with a coefficient of rect[illegible] equal to 0.28. The table lists by the month the [illegible] characteristics of the drift of the station NORTH POLE 4 in the Polar sector during its third year of operation. The data of the table show that the greatest range of the drift (maximum coefficient of rectilineraity) is characteristic of the summer months of June and July and the beginning of the fall in September. The maximum speeds of the real drift and of the true drift were [illegible] during the same period, while in the fall and winter period which began with October, a deceleration of the average speed of the real drift occurred; The average speed of the real drift was 7.21 km. per day for the period of June through September, decreasing to an average of [illegible] per day for the period of October through March. The maximum rates of the average speed of the real drift during the summer and fall were determined primarily by the greatest rates of the average wind velocity and the presence of innumerable openings in the ice caused by the summer thaw. In addition, during the summer, especially in June, when the ice-field of the station NORTH POLE 4

drifted towards the North Pole, which is still completely unreported, it was impeded by the influence of the [illegible] shores of Greenland, which are considerably remote -- [illegible]00 km. to 1000 km. distant -- from the sector of the drift of the station. The influence of the north shores of Greenland and the Canadian Archipelago was first observed after the period of September through November, when the ice-field of the station approached to within 500-400 km of the coast of Greenland. In this period under the same wind velocities, the speed of the real drift was significantly reduced in the directions of the movement of the ice to Greenland. The cause of the deceleration of the real drift in the fall and winter period was the covering of all the ice-free spaces at that time by new, solid ice, which was very intensively formed under the influence of the negative temperatures of the air.

From the table and the map it can be seen that beginning with October 1956 and up to the end of March 1957, the true drift was directed not to the strait between Greenland and Spitzbergen, where the discharge of the pri[illegible] mass of ice from the Arctic Ocean takes place, but to Perry Land, in the northern part of Greenland, and only

From the end of March to April 20th., when the [illegible] was decommissioned, did the ice floe begin to move [illegible] along the meridian of Greenwich (0°) towards the strait between Greenland and Spitzbergen to the Greenland Sea.

Disturbance of the discharge of the ice from the Central Polar Basin to the Greenland Sea exactly in the cold period of the year, when intensive ice-formation occurs, was directly indicated by the fact that in the winter of 1956/57 the Arctic Ocean was very weakly "unloaded" of its ice, and there was an increase in its power either on account of natural freezing or additional jamming.

In order to compare the rate of deceleration of the discharge of the ice to the Greenland Sea during the period of October through December 1956, let us set up some data for the drift of the station NP-1 and the ice-breaker G. SEDOV for roughly the same sector of the Arctic Ocean. From August through September 1937, the average speed of the discharging drift of the station NP-1 between Lats. 87° 45' - 86° 15' N. was established at 5 km. per day. From August through December 1939, the average speed of the discharging drift of the G. SEDOV in

e area between Lats. 8[illegible] 40' - 81° 30' N. established at 5.76 km. per day. These figures [illegible] that the discharging drift of the station NP-[illegible] Polar sector of the Arctic Ocean from October through December 1956 was 25% less than that of the station NP-1 and 21.7% less than that of the G. SEDOV. Distances of the discharging true drift and the real [illegible] of the station NP-1 and the ice-breaker G.SEDOV coincide. For the station NP-4 the coefficient of rectilinearity of the drift from October through December 1956 was established at only 0.22 (the ratio of the distance of the true drift, equal to 115 km., to the [illegible] of the real drift, equal to 510 km.) In other words, the nature of the drift of the station NP-4 in the fall and winter period 1956/57 sharply differs from the nature of the drift of the station NP-1 and the ice-breaker G. SEDOV and is evidence of a disturbance of the general pattern of the movement of the ice in the Atlantic area of the Arctic Ocean, the characteristic of which is the discharge of the ice to the Greenland Sea. As once the station NP-1 despite any suppositions of protracted

[illegible] in the vicinity of the North Pole, was [illegible] 7 months plus -- carried into the strait between Greenland and Spitzbergen, so despite all calculations the station NP-4 was found after a long time -- after 10 months -- between the North Pole and Lat. 85° [illegible] 400 km. NE of the northern extremity of Perry Land.

The decelerated discharging drift of the station from the sector of the North Pole towards the strait between Greenland and Spitzbergen in the fall and winter of 1956/7 was caused primarily by the general barometric conditions observed over the Central Polar Basin.

From October through December 1956, depressions [Author's Note: Region of low atmospheric pressure.] directed from Scandinavia to the Central Polar Basin, characteristic for this season in the long term average cycle of many years, were not observed. Beginning with October 1956, the barometric conditions were characterized as follows: In October cyclonic activity was actively developed north of the line from Spitzbergen to Franz Joseph Land, and also north of Greenland. The drift of the ice-cover was very weak, with bearings chiefly to the north. In November, cyclones lingered for days in the

vicinity of eastern and northern Greenland, and o[illegible] northern Spitzbergen. The ice floe station NP-4 [illegible] drifted west. December 1956 was characterized by the development of multicentered depressions in the Atlantic, the Bering Sea, Greenland, and the Canadian Archipelago, toward which the ice floe of the station NP-4 slowly shifted. From January through March 1957, the cyclonic activity was developed chiefly in the north of the Bering Sea. The ice floe of the station NP-4 drifted with negligible speed to the side of Greenland and the Canadian Archipelago.

On the map are charted the average pressures over the Central Polar Basin for the period of October through March 1956/57, a total of 182 days. The nature of the barometric relief determined the bearing of the drift of the ice from the Atlantic area of the Arctic Ocean to Greenland and the Canadian Archipelago, but not to the strait between Greenland and Spitzbergen, which is regarded as the basic cause of the delay in the discharge of the ice over an extended period of time. The true drift of the station NP-4 for the indicated period was established

at only 228 km., bearing of the drift: 260°, at an average speed of drift of 1.25 km. per day. In such a way, the coincidence of the true drift of the station NP-4 for the half-yearly period with the direction of the isobars is convincingly demonstrated.

Analysis of the drift of the station NP-4 with other stations and ships shows that the region of the discharging drift in the Atlantic area of the Arctic Ocean was chiefly disposed to the west of a line from the 160th. E. to the 20th. W. meridians. For an individual ice-field such as, for example, the one reported on, on which was organized the station NP-4, to travel the course from the North Pole to the Greenland Sea, the period of the year in which it is found in the immediate vicinity of the North Pole is decisively important. The greatest probable drift in the discharge to the Greenland Sea will be perhaps in the event that an ice-field is in the immediate vicinity of the North Pole until the formation of the fall and winter barometric relief, in April and May. In addition, great importance is also attached to

the sector of the passing of the North Pole. It is very likely that a separate ice-field will drift in the discharge to the Greenland Sea if it passes the North Pole on the side of the archipelago of Franz Joseph Land.

However, as was indicated above, the general nature of the discharging drift from the Atlantic area of the Arctic Ocean to the strait between Greenland and Spitzbergen will be determined by the atmospheric circulation prevailing over the Central Polar Basin chiefly in the fall and winter period, when the basic formation of the ice-cover of the Arctic Ocean and its contiguous seas is taking place. The degree of the "unloading" of the Arctic Ocean of its ice in this period depends to a considerable degree on the general iciness of the contiguous arctic seas, and consequently on the navigation conditions along the Northern Sea Route.

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